

ADAPTIVE SUBMODELING

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Submodeling is a technique which increase the resolution of a coarse grid solution in a specified subdomain by solving a local problem on a slightly larger subdomain with Dirichlet or Neumann boundary conditions obtained from the coarse grid solution.

The local problem may be solved in real time and thus submodeling allows interactive exploration of complicated solutions and effects of changes in the submodel, for instance a design modification, may be simulated in real time. Further a global high resolution solution can be obtained by solving a suitable number of local submodel problems covering the domain in parallel.

We develop a posteriori error estimates for submodeling algorithms using duality techniques. The a posteriori estimates are used to adapt the size of the subdomain as well as the resolution in the subproblem. We present applications of these adaptive techniques to 3D elasticity problems on industrial geometries.